1958-2

The Nucleus

Northeastern Section of the American Chemical Society

VOL. XXXV, No. 5 FEBRUARY, 1958

The NUCLEUS

OF THE NORTHEASTERN SECTION OF THE AMERICAN CHEMICAL SOCIETY

FRANCIS OWEN RICE

Catholic University of America

"Recent Advances in Free Radical Chemistry"

February 13, 1958 Thursday, 8:00 p.m.

PLACES OF MEETINGS

Dinner, 6:30 p.m.

The Campus Room, M.I.T. Graduate House

Address in Huntington Hall (Room 10-250)

The Massachusetts Institute of Technology

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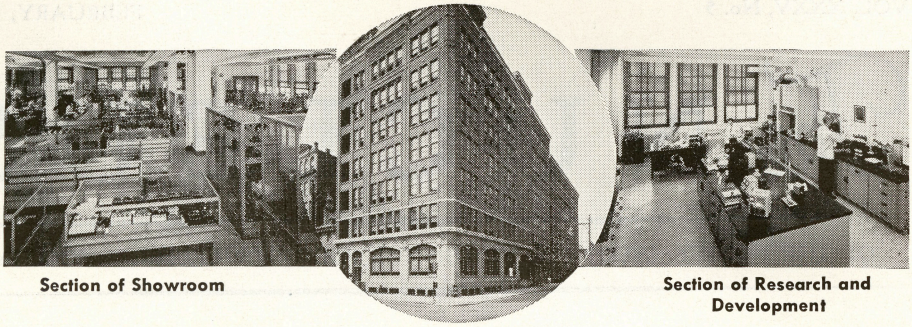

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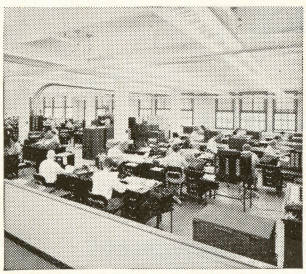

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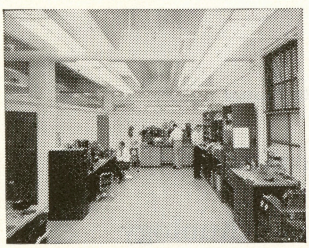

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THE FOUR-HUNDRED AND SIXTY-SIXTH MEETING

of the

NORTHEASTERN SECTION A. C. S.

THURSDAY, FEBRUARY 13, 1958

The Massachusetts Institute of Technology, Room 10-250

Entrance, 77 Massachusetts Avenue or the Dorrance Biology Laboratories

AFTERNOON MEETING

There will be no afternoon meeting in February 1958

5:30 p.m. Preprandial Hour (reservations necessary) followed by

6:30 p.m. Dinner (reservations necessary) in the Campus Room of the M.I.T. Graduate House, entrance from the street, 308 Memorial Drive.

Price $2.75 per person (tax incl.)

Should you desire a place reserved, mail the enclosed post card, at once, or, after 2:30 p.m. Thursday, call UNiversity 4-6900, Ext. 2961.

EVENING MEETING

Lockhart B. Rogers, presiding

Francis Owen Rice, Catholic University of America, Washington, D.C.

8:00 p.m. "Recent Advances in Free Radical Chemistry"

9:15 p.m. Social hour in the Moore Room (6-321 in the Eastman Laboratories)

Signing and mailing the dinner card or telephoning for reservations must be regarded as obligations.

All interested are invited.

After five-thirty o'clock, the Reception Hall of the Campus Room, 308 Memorial Drive, west side of the Graduate House, will be available for members of the Section planning to attend the dinner.

A Committee will be in charge.

Facts you should know about

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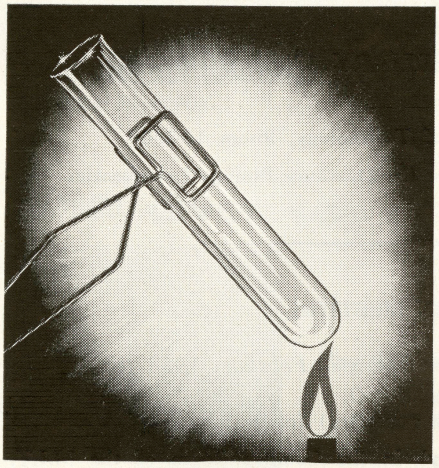

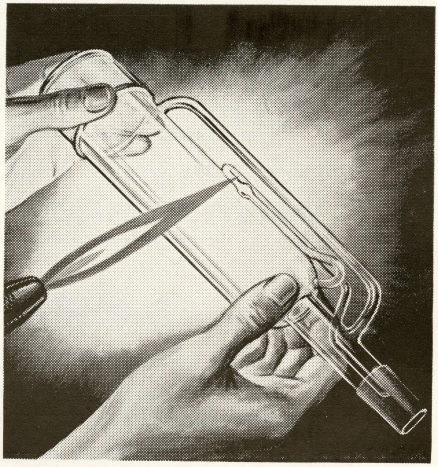

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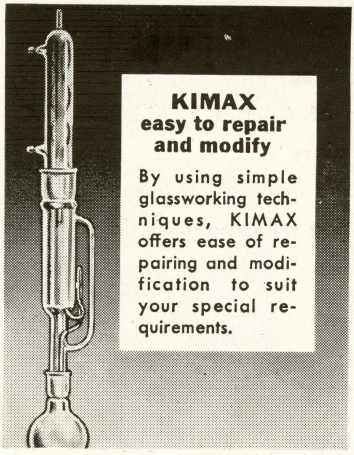

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The NUCLEUS

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THE NUCLEUS is distributed to the members of the Northeastern Section of the American Chemical Society, to the secretaries of the Local Sections, and to editors of all local publications.

Forms close for advertising on the 15th of the month and for text on the 12th of the month preceding issue.

Editorial

A NEW HOME FOR THE AMERICAN CHEMICAL SOCIETY

The decision was made about four years ago to proceed with plans for the American Chemical Society to move forward in its service to its greatly increased membership. At that time, now long past, the Finance Committee of our Society made a clear and definite choice to go ahead with those services commensurate with expanding numbers in the Society rather than to get along in quarters already taxed to the utmost. In accordance with this decision a vision of the not very distant future foresees a stately and adequate home for the American Society on the very site which has become a Mecca to the chemists of America and their many kindred spirits from other lands.

The cost of this new building will reach three million dollars, according to the estimates. How can this sum be accumulated? The answer could be found in more than one way. The most democratic procedure would be that every one of the 82,000 members, chemists and chemical engineers, contribute to the very best of his means. An average of $36 for each member would assure the new building being free from mortgage at birth. The years ahead then could and should be devoted to the promotion of the science of chemistry in all of its branches while the Society stood on its newly constructed foundation free from any encumbering debt. Let us all resolve to contribute some support for the new and more adequate home for the American Chemical Society to rise on the ground now become hallowed by the workers who there have shown their devotion to the ideals of the A.C.S.

The Northeastern Section

FEBRUARY SPEAKER

FRANCIS OWEN RICE

Francis Owen Rice was born in Liverpool, England, on May 20, 1890. His higher education was acquired at the University of Liverpool where he received the D.Sc. degree in 1916. From that date to the close of the First World War, he held positions in the chemical plants in England. At the end of the war he came to Princeton University on an 1851 Exhibition Fellowship. His next position was that of an assistant professor of chemistry in New York University, from 1919 to 1925. Leaving New York he went to Johns Hopkins University where he remained until 1938, holding the positions of associate and associate professor. For the past twenty years he has been professor of chemistry and head of the Chemistry Department at the Catholic University of America, Washington, D.C.

More than eighty scientific papers have come from Dr. Rice's researches. In addition he is the author or co-author of three books, the American Chemical Society Monograph "The Mechanism of Homogenous Organic Reactions" by Francis Owen Rice, "The Aliphatic Free Radicals" with his wife, Mrs. Katherine K. Rice and "The Structure of Matter" with Edward Teller.

In 1930, Dr. Rice and Katherine Kempner were married. They have two daughters, Mrs. Dieter Wendling of Detroit, Michigan, and Cecilia Rice of Washington, D.C. Mrs. Rice is a psychiatrist, holding both the Sc.D. and the M.D. from Johns Hopkins.

Through Mrs. Rice's professional work, Professor Rice became interested in Linwood's Children's Farm, Inc. This institution is a non-profit, non-sectarian, interracial research cen-

(*Please turn to next Page*)

FRANCIS OWEN RICE

(*Continued from previous Page*)

ter for emotionally disturbed children. Professor Rice is interested particularly in developing the research aspects of the program of the center.

Dr. Rice has been a member of the American Chemical Society since 1919.

ANALYTICAL GROUP

FRANK O'HALLORAN, President, Water Laboratory, Commonwealth of Massachusetts, Lawrence, Mass. MUrdock 2-5237.
RUSSEL T. WERBY, Secretary-Treasurer, Werby Laboratories. LI 2-0739.

The fifth meeting will be held at 8:00 p.m. on Wednesday, February 19, 1958, in Room 2-131, M.I.T.

Bert L. Vallee of the Harvard Medical School, the Peter Bent Brigham Hospital and the M.I.T. Biology Department, will speak on

"The Cyanogen-Oxygen Flame in Emission Spectrometry"

Prior to the meeting there will be a dinner at 5:45 p.m. in the M.I.T. Faculty Club on the sixth floor of the Sloan Building at 50 Memorial Drive, Cambridge. Reservations may be made by telephoning Mr. Russell T. Werby of the Werby Laboratories, LI 2-0739.

All interested persons are invited.

ANALYTICAL SPEAKER

BERT L. VALLEE

Bert L. Vallee, the speaker before the Analytical Group for February was born in Hemer, Westphalia, Germany, June 1, 1919. He is a naturalized American citizen.

His college training was acquired in Bern, Switzerland, where he received the B.S. degree in 1938. Coming to the United States, he obtained the M.D. degree from New York University in 1943.

Dr. Vallee has been associated with the Harvard Medical School since 1945. He is now an assistant professor in the school. He is a member of Biochemical Society, the Society of Clinical Investigation, the Optical Society of America and the New York Academy of Science. He joined the American Chemical Society in 1952.

The researches which have interested Dr. Vallee include the analytical detection and the function of trace elements in biological systems and their interaction with organic molecules and with proteins especially those having enzymatic activity. This work has emphasized the technique of absorption spectroscopy. Of late it has been concerned with the flame as an emission source. Recently it has led to the development of a high temperature flame.

ELASTOMER & PLASTICS GROUP

MAX TAITEL, Chairman, U.B.S. Chemical Corporation, University 4-7300.

J. HORACE FAULL, JR., Chairman-Elect, Consultant, KIrkland 7-8334.

The fourth meeting of the year will be held on Tuesday, February 18, 1958. It will be held in the Morse Auditorium of the Museum of Science, Science Park, Charles River Dam, Boston, Massachusetts.

Dr. Robert J. Myers of the Rohm and Haas Company will speak on

"Recent Developments in Applications of Acrylic Polymers"

Dr. Myers will discuss the recent rapid growth in the development of acrylate and methacrylate polymers for many industrial applications considered in terms of the bases on which acrylic polymers were selected and the properties which have enabled acrylic polymers to do a unique job. Newer developments in the use of acrylic polymers in the plastics, coatings, paper, textile, rubber, leather and water conditioning fields will be reviewed with illustrative examples.

Preceding the meeting there will be a preprandial hour at 6:00 p.m. (cost $1.00), followed by a dinner (cost $3.00) at 6:45 p.m. in honor of the

(*Please turn to Page* 118)

ELASTOMER & PLASTICS GROUP

(*Continued from Page* 116)

speaker, in the Morse Auditorium.

Reservations for the preprandial hour and the dinner are necessary and may be made in writing or by phone with Mr. Henry S. Anthony, Tyer Rubber Company, 10 Railroad Street, Andover, Mass. (phone Andover 3090) no later than 10:00 a.m. Monday, February 17, 1958. Reservations are binding.

All interested persons are invited.

ELASTOMER & PLASTICS GROUP SPEAKER ROBERT J. MYERS

Robert J. Myers was born in Omaha, Nebraska, August 1909. He received his undergraduate training at Creighton University, where he obtained the B.S. degree in 1931. His Ph.D., in physical chemistry, was conferred by Johns Hopkins University in 1935. During 1934-1935 he was a Research Associate at Johns Hopkins Hospital. From 1935-1937 he was a Research Associate in the Department of Chemistry at the University of Chicago.

In 1937 he joined the Rohm & Haas Company, where he is presently Assistant to the Vice-President in charge of Research. He had been successively Research Chemist, Laboratory Head and Research Supervisor. For the last six years he has been engaged in staff activities.

Dr. Myers principal areas of activities have included the applications and the research and development of synthetic polymers and surface active agents in coatings, paper, plasticizers, textiles, plywood, agriculture and ion exchange resin fields. He became a member of the American Chemical Society in 1928.

HIGH SCHOOL SPONSORS COMMITTEE

An announcement describing a program of the Chemistry Education Committee for a contact program with local high schools is inserted in this issue of THE NUCLEUS.

BOSTON SECTION OF THE ELECTROCHEMICAL SOCIETY

The fourth meeting of the Boston Section of the Electrochemical Society will be held at 8:00 p.m. on Wednesday, March 5, 1958, in the Campus Room of the M.I.T. Graduate House. There will be a preprandial hour at 5:30 p.m. with dinner following at 6:30 p.m. The cost of the dinner will be $3.00.

Dr. Harry C. Gatos of the M.I.T. Lincoln Laboratories will speak on

"The Corrosion of Germanium"

This meeting will be held jointly with the National Association of Corrosion Engineers.

All interested persons are invited.

At this meeting Dr. Gatos will summarize the studies which have been made on the chemical behavior of germanium surfaces in oxidizing liquid media as influenced by surface treatment, crystallographic orientation and the concentration of mobile carriers. The principal media employed were water containing dissolved oxygen and nitric acid solutions containing various amounts of nitrous and hydrofluoric acids.

RICHARD W. FESSENDEN MEMORIAL SCHOLARSHIP

A committee of former students of the late Richard W. Fessenden, Professor of Chemistry at the University of Massachusetts has started to build a memorial scholarship in his name. This fund, to be administered by the University of Massachusetts Foundation, will be used for tuition scholarships for outstanding undergraduate chemistry majors at the University of Massachusetts.

Contributions to the fund may be sent to

Mr. Stanley Polchlopok, Treasurer
Richard W. Fessenden Memorial
Scholarship Fund
American Cyanamid Co.,
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This communication comes from the desk of Alexander R. Amell, Assistant Professor of Chemistry in the College of Technology of the University of New Hampshire.

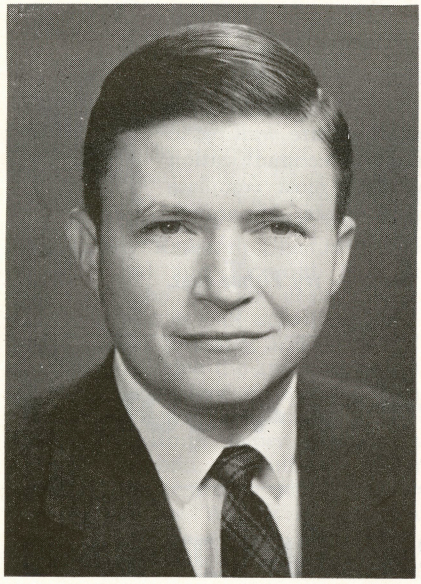
A NEW HOME FOR THE AMERICAN CHEMICAL SOCIETY

How to make the plans take form for a new headquarters building for the American Chemical Society in Washington, D C.? Let all members of the Northeastern Section of the A.C.S. and friends of the American Chemical Society join in helping the Committee Chairman, Fred Warren McLafferty, the Vice-Chairmen, Edward A. Atkinson and Eugene C. Rochow and the whole committee to do our share. In the words of Russell T. Werby, in whose keeping lies the publicity for the fund raising in our Section, "The aim is to contact directly the 2,434 members of the Northeastern Section for supporting the new home."

There follows, here, the members of the committee as received by the NUCLEUS up to January 23, 1958. Names of other volunteer helpers will be forthcoming.

NORTHEASTERN SECTION OF THE ACS BUILDING FUND DRIVE COMMITTEE

CHAIRMAN OF FUND RAISING CAMPAIGN



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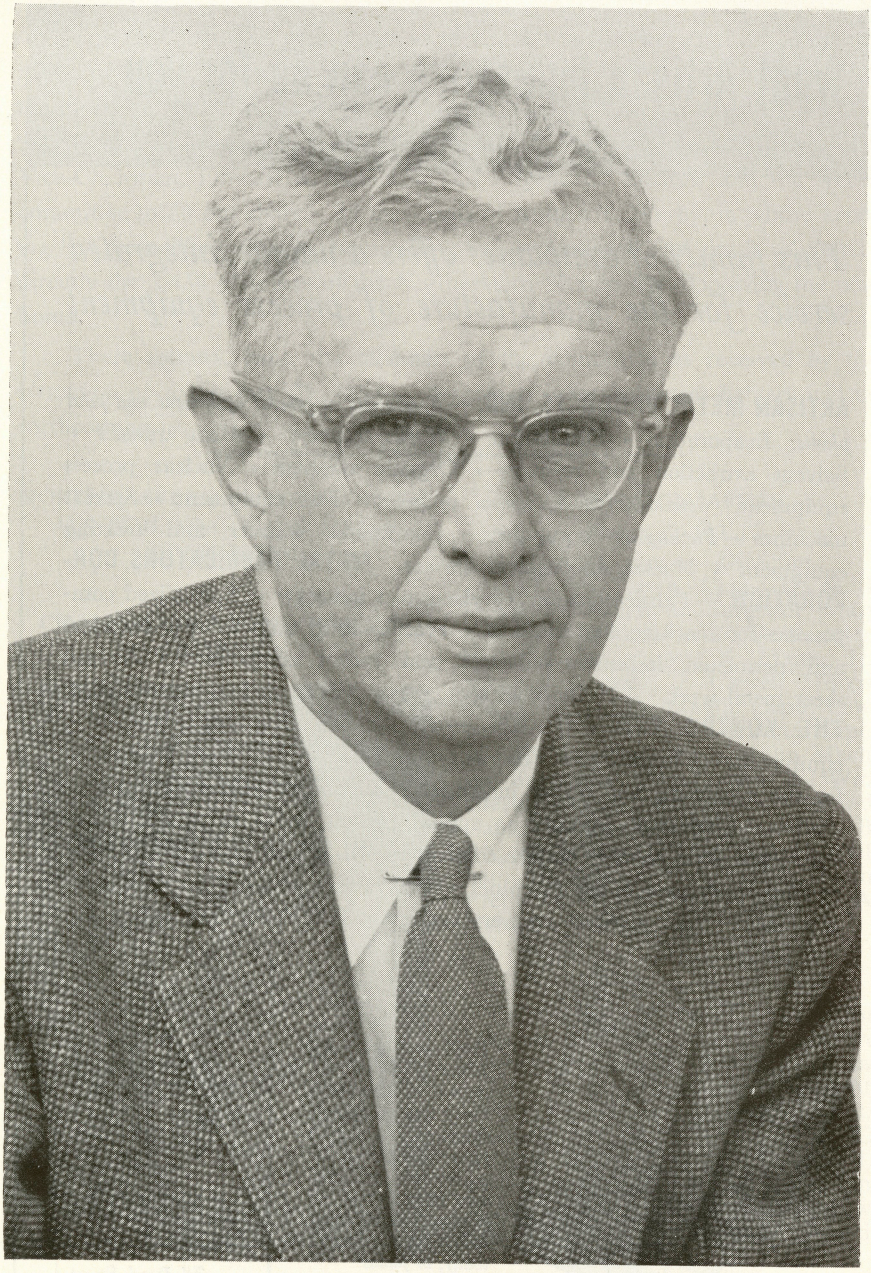


ARTHUR ANDREW VERNON

DEAN OF THE NORTHEASTERN GRADUATE SCHOOL

ARTHUR A. VERNON

Dean of the Northeastern University Graduate School

Dr. Arthur A. Vernon, Chairman of Northeastern University's Department of Chemistry, has been named Dean of Northeastern's new Graduate School which will be established July 1, 1958, President Carl S. Ell announced on Friday, January 3, 1958.

Nearly 2,500 students are currently studying for master's degrees in the four areas of graduate work offered by the University in Engineering, Education, Business Administration, and Liberal Arts.

As the first Dean of the new school, Dr. Vernon will co-ordinate the activities of all graduate study and be responsible for the further expansion and development of the academic programs.

The Graduate School will be located in Northeastern's proposed $1,000,000 Graduate Center, construction of which will be started late this Spring and completed by the summer of 1959.

According to Dr. William C. White, University Vice-President, the creation of the Graduate School at Northeastern is "designed to meet the steadily growing pressure" for more academic work on the graduate level.

"Although pressure for increased graduate work is strong at present," Dr. White said, "the need will undoubtedly become more urgent in the next decade and we feel the time has now arrived to widen an anticipated 'bottleneck' at the graduate level."

The demand especially from business and industry in recent years for more graduate work has been greater than ever before, he said.

A member of Northeastern's faculty for the past 20 years, Dr. Vernon initiated the first programs leading to the master of science degree 15 years ago in the College of Liberal Arts.

From 1938 to the present time he has been teaching courses in chemistry and serving as Chairman of the Department. Beginning with the academic year 1958-1959 on July 1, Dr. Vernon will devote his entire time to the co-ordination and planning of new developments in the Graduate School.

A graduate of Union College with B.S. and M.S. degrees and Princeton University with a Ph.D. in chemistry, he has been active in a number of professional societies. He has held many top positions in the American Chemical Society and is also a member of the American Institute of Chemical Engineers, the American Academy of Arts and Sciences, Sigma Xi, Lambda Chi Alpha, Phi Kappa Phi, and the New England Association of Chemistry Teachers. He became a member of the American Chemical Society in 1924.

The author of more than 30 technical articles and co-author of a textbook in chemistry, Dr. Vernon is a former faculty member of the University of Rhode Island. He was also a research chemist with General Electric and the E. I. duPont de Nemours Co., and has been a consultant for Arthur D. Little, Inc. in Cambridge for 15 years.

Professor and Mrs. Vernon with their daughter, Eleanor, make their home at 14 Standish St., Newton Highlands.

RECENT WORK ON THE INITIATION OF CHAIN REACTIONS[1]

An address before the Northeastern Section, A.C.S., January 9, 1958

By PAUL D. BARTLETT, Harvard

A chain reaction proceeds by repeating chemical cycles involving a highly reactive and short-lived intermediate. This intermediate may be an excited state, ion, atom, free radical, or even an elementary particle such as a neutron. In organic chemistry most chain reactions involve atoms and free radicals, and this discussion will be concerned only with these.

Organic chain reactions may be initiated by heat, light or chemical reagents acting directly on the reactants. A very general way to initiate chain reactions is to introduce any free radical at a low rate into the reactants. Whether related to them chemically or not, a reactive free radical will attack the reactants in such a way that after a single cycle only their own product results.

Therefore the most universal way to initiate chain reactions is by means of thermally unstable substances which will spontaneously decompose to free radicals, and this way of initiating chain reactions is the subject of the present discussion. The chief way in which this method of chain initiation may backfire is through the formation of free radicals which are already much more stable than those which it is desired to form in the chain reaction. It is possible for a radical to be so long-lived that it survives to react with the chain carriers and bring about termination, not initiation, of chains. Such is the case with the classical triphenylmethyl radical, which will serve as an inhibitor rather than an initiator of the polymerization of vinyl and allyl esters.

The commonest types of initiators are those containing either the O-O or the N=N bond - dialkyl or diacyl peroxides, peresters, and azo compounds. The two kinds of bonds make good initiators for different reasons. The O-O bond has a strength of only about 33 kcal. and breaks at temperatures from 50 to 150°C. into alkoxy or acyloxy radicals. The N=N bond does not break, but in the process of forming molecular nitrogen enough energy is contributed to facilitate the simultaneous cleavage of the two C-N bonds flanking it, so that two carbon radicals are produced.

Evidence for the involvement of a single O-O bond only in the thermal decomposition of benzoyl peroxide has been provided by Hammond[2] while Cohen and Wang[3] have shown that substitution on both sides of an azoalkane contributes simultaneously to establishment of the energy of activation for the decomposition and, therefore, that both C-N bonds are involved in the rate-determining step. Although the cleavage of a single O-O bond appears to be a general mechanism for chain initiation by dialkyl peroxides, substituted benzoyl peroxides and substituted t-butylperbenzoates, there are indications of a sharp change of mechanism when in a diacyl peroxide $(RCOO)_2$ or a perester $RCO_3C(CH_3)_3$ the group R is one which is capable of some stabilized existence as a free radical. Thus, the peroxide of phenylacetic acid decomposes briskly below room temperature while that of diphenylacetic acid has so far eluded preparation. The mechanism best able to account for these facts is a two-bond decomposition entirely similar to that recognized among the azo compounds but producing carbon dioxide instead of nitrogen.

In the series of t-butyl peresters as R is varied from CH_3 to $(C_6H_5)_2C(CH_3)$ the rate of decomposition at a given temperature increases by five powers of ten, the enthalpy of activation, $\Delta H^{\pm}$, drops from 38 to 24.7 kcal. and the entropy of activation drops from 17 to 3.3 e.u. The radical stabilities inferred from this behavior are in the order methyl < trichloromethyl < t-butyl < benzyl < cumyl < benzhydryl < *a,a*-diphenylethyl < phenylallyl. The study of this rather readily accessible series of compounds thus appears to offer a way of estimating the resonance energies of some short-lived free radicals which cannot be studied under equilibrium conditions.

The effect of introducing methyl and phenyl groups in place of hydrogen in the methyl group of a perester is quantitatively similar to the effect of the same substitution in azomethane, as reported by Cohen and

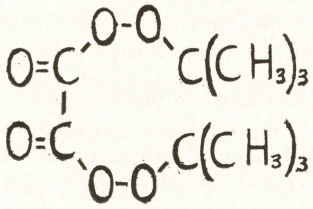
Wang. There are two important differences, however. In the peresters, the introduction of a second phenyl group produces substantially less effect than the introduction of the first, whereas in the azo compounds no such diminishing returns are noted. In the azo compounds there is no regular trend of the entropy of activation as the energy of activation is lowered. In the peresters, however, the substantial lowering of activation energy with increasing radical stability is accompanied by a progressive lowering of the entropy of activation, which tends to lower rather than to raise the reaction rate. This is a familiar phenomenon in various fields of chemistry. In the present instance there is an attractive mechanism for the parallel trend of $\Delta H^{\pm}$ and $\Delta S^{\pm}$. Because the transition state must be geometrically compatible with the bonds which are being incipiently formed and with the resonance or electronic delocalization which is facilitating the process, the rotational freedom of the reacting molecule must be more or less restricted in order to achieve the favorable reaction which results from the formation of stable products in the transition state. It can be shown that increasing yields of stabilization energy from these products are associated with increasing orientation requirements and this must of course always mean decreasing entropy in the transition state.

In the present series of peresters arbitrary division into four groups according to the number of bonds, from zero to three, whose rotation must be frozen in the transition state results in a separation into cleanly bounded groups with respect to both $\Delta H^{\pm}$ and $\Delta S^{\pm}$ for decomposition.

The decomposition products are compatible with the concerted mechanism of decomposition and become particularly clean in those esters in which R equals cumyl, benzhydryl and *a,a*-diphenylethyl where the yield of carbon dioxide is essentially quantitative. The R group is accounted for as coupling and disproportionation products with variable amounts of the ether $ROC(CH_3)_3$. Both the rate and products of decomposition of t-butyltrifluoroacetate are so abnormal as to indicate decomposition by an ionic mechanism rather than the formation of free radicals.

These studies have opened up certain side lines which carry us afield from the initiation of chain reactions. For example, the fastest perester yet prepared is t-butyl-2-phenyl-3-perbutenoate with a half-life at 60° of four minutes and $\Delta H^{\pm}$ of 23 kcal., $\Delta S^{\pm}$-1.1. The phenylallyl radical which results from the decomposition is also produced from the isomeric ester t-butyl-4-phenyl-3-butenoate which, however, decomposes twenty-five times more slowly. The decomposition products of these two esters are very complicated because of simultaneous isomerization to peroxyesters of α,β unsaturated acids which are as stable as peracetates but which can be attacked by the free radicals produced in the decomposition.

As previously mentioned, free radicals which are too stable are unable to start chain reactions. Thus, we do not produce better initiators when their increased speed of decomposition is achieved by the generating of more stable free radicals. It is possible, however, to extend the azo principle one step further and utilize certain peresters which can yield not one molecule of carbon dioxide but two in the act of decomposition. Such a substance is di-t-butylperoxalate:



which yields no stabilized radicals on decomposition but which does give two molecules of carbon dioxide. This perester is a good initiator of such chain

reactions as the polymerization of styrene and of allyl esters at room temperature and it fits with respect to $\Delta H^{\pm}$ and $\Delta S^{\pm}$ into the series of simple peresters. In order to gain an idea whether this ester is producing one or two molecules of carbon dioxide in the initial rate determining step of decomposition, it has been compared with ethyl t-butylperoxyoxalate in which there is only one O-O bond and hence, the likelihood of only one carbon dioxide expulsion. The double perester shows a rate six times greater than the single, a $\Delta H^{\pm}$ 1.4 kcal. lower and a $\Delta S^{\pm}$ lower by only 0.9 e.u. Among the products of decomposition of the mono-perester in benzene, substantial quantities of both ethyl t-butyl carbonate and ethyl benzoate are found, whereas carbonates and benzoates (products of carbalkoxy radicals) are totally absent in the decomposition of di-t-butyl peroxalate. This evidence suggests that a limit has not yet been reached to the possibility of making more active chain initiators with the simultaneous breaking of several bonds.

The experiments reported are from the thesis of Dr. R. R. Hiatt, the predoctoral research of Messrs. A. R. Feldman and R. Pincock, and postdoctoral work of Drs. D. M. Simons and E. P. Benzing.

References

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2. G. S. Hammond and L. M. Soffer, J. Am. Chem. Soc., **72**, 3628 (1955)
3. S. G. Cohen and C. H. Wang, J. Am. Chem. Soc., **77**, 3628 (1955)

NORTHEASTERN SECTION — AMERICAN CHEMICAL SOCIETY

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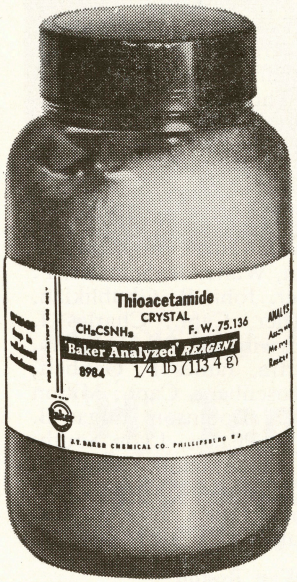

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(*Continued from Page* 120)

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MEETING OF THE DIRECTORS OF THE NORTHEASTERN SECTION OF THE AMERICAN CHEMICAL SOCIETY

Because of Christmas mail the minutes for the December meeting of the Directors was received too late for inclusion in the January NUCLEUS.
—Editor

The December meeting of the Directors was held at 4:35 P.M., December 3, 1957, in the Moore Room at M.I.T., Chairman Lockhart B. Rogers presiding. The following members were present: Avery A. Ashdown, Robert D. Eddy, John T. Blake, Edward R. Atkinson, David M. Howell, Henry A. Hill, P. Calvin Maybury, John A. Timm, Lloyd H. Perry and Fred W. McLafferty. The minutes of the November meeting were accepted as distributed.

Lloyd H. Perry reported that the balance as of December 1, 1957, was $2,659.15. During November the expenses were $160.92. There was no income.

The report of the Chemistry Education Committee was delivered by P. Calvin Maybury. A program for the coming year was formulated at a recent meeting of the Committee. Members of the Section will be solicited to maintain contact with their high schools. About 70 members will be needed. This technique has worked out well in other sections and will permit other programs of the committee to funnel through these contact people. Three lecture series on the chemistry of rockets are planned for high school teachers during the winter. A gifted student program committee is to be organized consisting of two high school teachers and two A.C.S. members. The committee will work jointly with the Public Relations Committee in evaluating the possibility of setting up a speakers' bureau.

Henry A. Hill announced that the section has gained three new members. Twenty-seven have moved in and twenty have transferred out, leaving a total of 2,410 as of December 3, 1957.

In reporting for the Nominating Committee, Edward R. Atkinson urged members to send suggestions for candidates for national office.

Fred W. McLafferty outlined in detail the A.C.S. building fund campaign. Three million dollars are needed for a new A.C.S. building in Washington, D.C.

The secretary reported on the forthcoming annual report. Various methods were discussed for improving its general quality.

There being no further business, the meeting adjourned at 5:45 P.M.

Respectfully submitted,
RIDGLEY G. SHEPHERD, JR.
Secretary

MEETING OF THE DIRECTORS OF THE NORTHEASTERN SECTION OF THE AMERICAN CHEMICAL SOCIETY

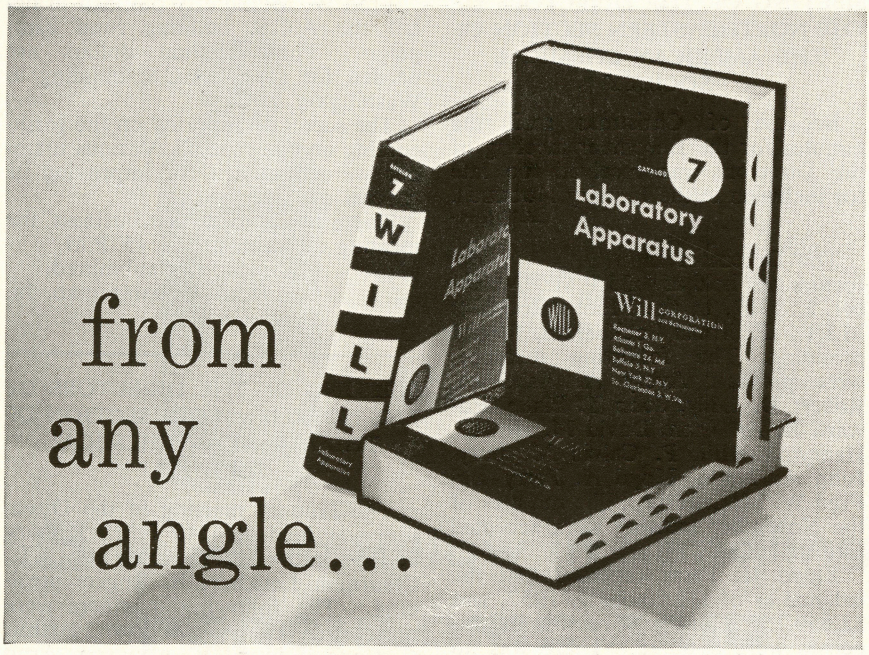
The January meeting of the Directors was held at 4:40 P.M., January 7, 1958 in the Moore Room at M.I.T., Chairman Lockhart B. Rogers presiding. The following members were present: Avery A. Ashdown, Arthur C. Cope, Edward R. Atkinson, Arno H. A. Heyn, Henry A. Hill, David M. Howell, P. Calvin Maybury, Lloyd H. Perry, Arnet L. Powell, Howard H. Reynolds, Robert A. Shepard and Ridgley G. Shepherd, Jr. The minutes of the December meeting were accepted as corrected.

Chairman Rogers announced that the Section will have oniy seven instead of eight councillors in 1958 due to a change in divisor. The new divisor figure was released by A.C.S. headquarters in December. Since there were eight elected Councillors and Alternate Councillors, it was necessary to drop one of each. This was done by a drawing since a certified list of Councillors was needed by A.C.S. headquarters prior to January 1, 1958. As a result of the drawing Elkan R. Blout and C. Richard Morgan were taken from the Councillor list. The action was confirmed by the Directors. A discussion resulted on various procedures for dropping Councillors in the event this situation arises again.

On a motion duly made and seconded, it was

VOTED that the Committee on Amendments to the Constitution and By-Laws be requested to for-

(*Please turn to Page* 133)



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MEETING OF THE DIRECTORS

(*Continued from Page* 131)

mulate suggestions as to a procedure for dropping Councillors in the event the Councillor divisor is increased.

The Treasurer's report was presented by Lloyd H. Perry. During the period from December 1, 1957, to January 1, 1958, the income was $22.00 with expenses of $349.53. The current balance is $2,331.62. The report was accepted.

P. Calvin Maybury delivered the report of the Committee on Chemistry Education. The various plans announced at the December meeting of the Directors are well underway. A series of lectures for high school teachers will be held at Science Park beginning on March 6, 1958. Presentation of this series is being assisted by the Museum of Science and the N. E. A. C. T. The Sub-Committee for Summer Employment of High School Teachers is starting a mail campaign in several weeks. They plan to circulate lists of available teachers and summer positions. A Speakers' Bureau Sub-Committee has been organized jointly with the Public Relations Committee. This committee consists of William E. Gordon, Chairman, Ronald M. Milburn, Norman D. Loud and J. Horace Faull, Jr. Arrangements have been made by this Committee for Austin W. Fisher, Jr. to speak before a P. T. A. group in Reading in January.

Arnet L. Powell, Chairman of the Public Relations Committee, reviewed the Section activities in television and radio. Dr. Powell participated in the December "Dimensions" program. The topic concerned new developments in chemistry. The January and February programs are planned. Arrangements appear to be well along for presenting the A.C.S. taped programs over a prominent Boston radio station.

Henry A. Hill reported the current Section membership to be 2434 as compared to December's 2410.

According to David M. Howell, the December student night program was eminently successful with more than 30 schools represented. Robert A. Shepard reported that each student in attendance was publicized in his home-town newspaper. Due to a misunderstanding the Coffee Committee was burdened with extra clean-up duties. This situation has been corrected. The Directors expressed formal appreciation to the young ladies assisting the Coffee Committee.

Under old business, Chairman Lockhart B. Rogers reported that the Building Fund Committee has planned a kick-off meeting for January 30, 1958.

There being no further business. the meeting was adjourned at 5:40 P.M.

Respectfully submitted,
RIDGLEY G. SHEPHERD, JR.
Secretary

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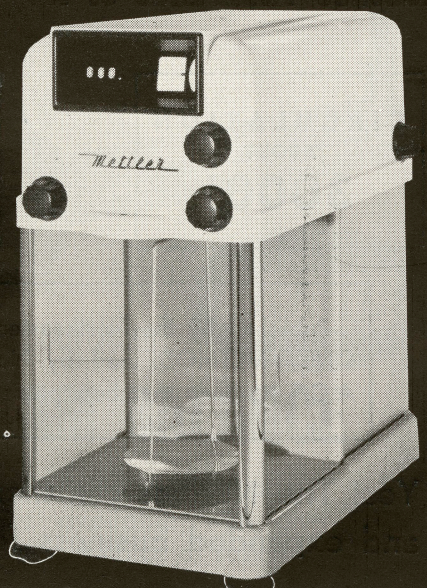

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